Zero Retries issue 0148 2024-04-19

Zero Retries is an independent newsletter promoting technological innovation that is occurring in Amateur Radio, and Amateur Radio as (literally) a license to experiment with and learn about radio technology. Now in its third year of publication, with 1500+ subscribers.

About Zero Retries

Steve Stroh N8GNJ, Editor

Jack Stroh, Late Night Assistant Editor Emeritus

In this issue:

- **Request To Send**
- **Illuminating Discussion About Meshtastic on Ham Radio Workbench Podcast**
  Steve Stroh N8GNJ and excerpts from HRWB
- **M17 / SP5WWP Videos on M17 Remote Radio Unit**
  Steve Stroh N8GNJ
- **ZR > BEACON**
  - **Armed Forces Day Crossband Test May 11, 2024**
  - **AREDN Release Candidate April 2024**
  - **Meshmail - email Over Meshtastic**
  - **BI7JTA Online Store (of Zero Retries Interesting Devices)**
  - **DigiRig Lite Now (kind-of) Available**
  - **Jobs at FlexRadio**
- **Join the *Fun* on Amateur Radio**
- **Closing The Channel**

Web version of this issue - https://www.zeroretries.org/p/zero-retries-0148

Request To Send

Commentary by Editor Steve Stroh N8GNJ

Paid Subscribers Update

My thanks to **Prefers to Remain Anonymous 27** for becoming a Paid Subscriber to Zero Retries this past week!

My thanks to **Prefers to Remain Anonymous 28** for becoming a Paid Subscriber to Zero Retries this past week! PtRA 28 included this nice message:

I'm impressed by the range of information you are making visible to me.

Thank you PtRA 28!

Financial support is a real vote of confidence for continuing to publish Zero Retries.

Major Conference Countdowns

- **Hamvention 2024** in Xenia, Ohio, USA on 2024-05-17 thru 19, in *04* weeks!
- **HAM RADIO 2024** in Friedrichshafen, Germany on 2024-06-28 thru 30, in *07* weeks!
- **JARL Ham Fair 2024** in Tokyo, Japan on 2024-08-24 and 25, in *18* weeks!

See other events at the Zero Retries Guide to Zero Retries Interesting Conferences.

Zero Retries 0147 Comments - New Record - 40+

I'm agog at the number of comments, and the number of commenters, resulting from the topics discussed in Zero Retries 0147. We commenters had (and as I write this mid-week, the discussions continue) wide-ranging conversation(s) about Amateur Radio data networks, exchanging a number of views. Honestly, that was incredibly fun to see the discussions - between subscribers. *I really loved all that discussion - Thanks folks!*

While the comment function works as (Substack) intended (light, focused comments), I found that the commenting in Substack quickly grew awkward as the topics diverged (forked) a bit, and it got harder to keep track of the discussion forks. And, only the commenters were aware of the discussion (if you comment, you receive notifications).

The amount of discussion that resulted from Zero Retries 0147 reminded me that I need to get busy on creating a Zero Retries discussion (mailing) list on Groups.io. That's been on the Zero Retries "to do" list for a while now, but publishing Zero Retries every week, and working on the book, has kept me pretty busy of late. Given that there are > 1500 Zero Retries subscribers, a Zero Retries mailing list would immediately blow past Groups.io's free tier (100 maximum), requiring a Groups.io Premium (paid) tier. Thus, that's another expense in publishing Zero Retries that is offset by the wonderful folks who opt for Paid Subscriptions of Zero Retries.

I know that I ought to also create a parallel Zero Retries Discord server (discussion… not physical, but Discord calls a discussion group a "server"), but I'm not up to managing that and a Groups.io group quite yet.

Podcasts *Need* Transcripts

The first article, below, discusses a podcast, and thus this observation.

One of my frustrations about many podcasts is that they're "audio only", especially podcasts done by non-professionals. That is, no transcripts, few if any show notes, etc. But us Mac and iPhone / iPad users now have a solution to that issue - the Apple Podcasts apps now automatically (machine) generates a transcript of any podcast you listen to in an Apple Podcast app. Thus, that capability made a tedious task - teasing out the relevant portion of this podcast into text, ~~easy~~ easier, just search, copy, and paste. And copy and paste… and copy and paste…

To prevent copy and paste being too easy for entire podcasts, Apple limits the amount of text that can be copy and pasted from the Podcast app's automatic transcript to approximately two paragraphs at a time. Thus to get the snippet of the podcast below required multiple copy and paste cycles. Tedious, but manageable.

In browsing a bit, Apple allows the podcast creator to access their transcription of podcasts to embed the (full) transcription into the podcast's "page" via Apple's podcast distribution. Thus podcasters don't have to go to the expense of having their podcast transcribed; as I read it, that service from Apple is free.

Yes, I'm aware that there are dedicated transcription services out there for transcribing video and audio recordings, especially now in this era of good-trending-towards-great transcription using Artificial Intelligence techniques, but those are subscription services and I'm not quite to that point, yet.

Because I can now read / skim a transcript, a number of podcasts are now *more accessible to me*, such as the Linux in the Ham Shack podcast.

Overly Ambitious Article on Next Generation Concepts of Amateur Radio Repeaters

A lot of ideas about the future of Amateur Radio repeaters came together this week, but they were pretty disparate, so it was requiring significant butt-in-chair time to weave that article together into a coherent whole. But 15:30 on Friday keeps coming at me irrevocably, and the article was not yet in reasonable shape for publication. Hopefully I'll have it complete next week for Zero Retries 0149.

In the meantime…

This week is bittersweet in our household - life can be way too short. Thus, after Zero Retries is completed, I'm declaring this a light "workweek" to *make* time for more fun, hands-on, *doing Amateur Radio* activities here in N8GNJ Labs.

73,

Steve N8GNJ

Leave a comment

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Illuminating Discussion About Meshtastic on Ham Radio Workbench Podcast

By Steve Stroh N8GNJ

Includes an excerpt from Ham Radio Workbench 205 - Guest Mark Herbert G1LRO, Ham Radio Workbench host George Zafiropoulos KJ6VU, and other HRWB co-hosts.

My thanks to Tom Salzer KJ7T for recommending the Ham Radio Work Bench (HRWB) podcast. They release new episodes biweekly, and discussions are often hands-on and technical, thus often Zero Retries Interesting… but the duration is sometimes 2 hours, and thus are challenging to make enough time for some weeks.

Because I've been trying to follow the progress of the G1LRO's Universal Radio Controller, I made time to listen to most of HRWB 205 - Universal Radio Controller with Mark Herbert G1LRO.

Meshtasticl logo courtesy of Mestastic

There were many interesting discussion threads in this episode of HRWB, but one of the best bits was a brief, but pithy discussion of Meshtastic being contrasted with Amateur Radio, between Mark Herbert G1LRO and the HRWB host and co-hosts.

> So I was thinking I'll probably put this [Meshtastic node] up on the roof and just leave it as a note to kind of help the mesh. It really comes back to the old days of Packet Radio, which I really enjoyed back in the 80s when this was the same thing, really. You were connecting, you know, computing devices together across AX25, and that was the same sort of thing.
>
> You could hop through other people to get to your destination.
>
> So I have to ask you a question. Since we're on the Meshtastic rat hole, and this conversation topic came up in a previous episode, and my comment about Meshtastic was it feels like a solution looking for a problem. And when I look at something like this, I tend to look at it two ways.
>
> One is the technology. What is it? What does it do?
>
> How does it work? And all that. And then separately, like, what would you do with it?
>
> So the technology part I totally get. I mean, you know, put up a mesh radio, connect it to other radios, be able to send some data. That's very interesting to me.
>
> However, on the other side, which is like to what end, I have no idea. So aside from the fact that you could put one up and connect to somebody else, do you have any idea of like what it would be useful for?
>
> I think it's useful for getting people excited about this stuff, for one, because, you know, there's a community there and it's kind of a, it's like, it's almost like an underground community they can connect to and that they know something's going on, but you need to have one of these to be part of it. So I think it's really useful for like the Arduino generation because it is effectively an ESP32 and you use the same ID and everything. For forgetting that, I forget the Arduino generation interested in radio technology and communicating through radio.
>
> So I think as a kind of gateway drug into amateur radio, this is fantastic because we can get some of those guys then pulled in and say, you know, you've built something, you understand the tech and you've got the buzz. Now find out what you can do if you get licensed and you can talk around the world and use some of the really exciting stuff that we're doing.
>
> So actually as a motivator to get other people who may not be thinking of Ham Radio interested, so that makes sense.

And with that… I'm now convinced to get involved with Meshtastic.

There's a precedent to this moment where Meshtastic as an "entry level radio technology" is rapidly becoming popular (bordering on *wildly* popular, at least among techies). The popularity of Meshtastic, and the enthusiasm of the Meshtastic users could "bleed over" into Amateur Radio. In the US, the Citizens Band Radio Service rose out of obscurity (it was created in 1945) and became rabidly popular in the early 1970s1. Having gotten a "taste" of the fun (and utility) of CB as entry level radio communications, many "CBers" became Amateur Radio Operators for the fun (and utility) of being able to use VHF / UHF repeaters2, do "skip" (and use more transmit power than 5 watts) legally, and many other activities in Amateur Radio. That "bulge" of new Amateur Radio Operators benefitted Amateur Radio enormously in numbers, in new talent, new energy in Amateur Radio, and in increased recognition of Amateur Radio in society.

Meshtastic is a perfect "easy entry point" into wide area data communications via radio for those that are comfortable with microcontrollers and embedded computers . Meshtastic's concept, documentation, the robust technology (LoRa), and especially the many self-support communities, make it easy to "get on the air". In the US, most Meshtastic activity is occurring on 902-928 MHz, which is overlaid between "Part 15" (license-exempt) use and Amateur Radio use. Thus there's no license required to get active on Meshtastic, and that's a huge advantage in getting people interested in wide area data communications via radio.

From the perspective of Amateur Radio, Meshtastic is "Amateur Radio data communications *Lite*".

Like G1LRO, I now think that us Amateur Radio Operators that are active in data communications via radio should get busy and get online with Meshtastic and start participating with your local Meshtastic users. Make yourself (subtly) known as an Amateur Radio Operator, and be prepared for the inevitable inquiries from the most enthusiastic Meshtastic users about "well, *how can I* go to the next level" - faster speeds, more interesting uses, etc. Be ready with a story and applications such as a BBS, email, file transfers, etc. For example, the folks in the North Carolina Packet (NCPACKET) network, EastNet Packet Network, Southern California AREDN Mesh Network, and others could get involved in their local Meshtastic networks and offer mentoring to Mestastic users that wished to learn more about Amateur Radio.

I think the critical thing about inviting Meshtastic users to participate in Amateur Radio is *to have something interesting online and operational* that really is "next level" beyond Meshtastic to show to them, such as the networks in the previous paragraph. In my opinion, only having a few APRS digipeaters, Winlink RMS stations, especially with legacy packet radio (1200 bps AX.25) etc. won't impress Meshtastic users too much. Also, there needs to be local documentation about "how to join in the fun", such as the excellent "onboarding" documentation developed by Terrestrial Amateur Packet Radio Network (TARPN).

And, full disclosure, *I'm* not there yet in being able to offer the "next level" experience I described to Meshtastic users in my area. Nor is that infrastructure in place to offer an interesting "next level" experience… but I'll be working on doing so. But in the meantime, I'm going to work on getting online with Meshtastic, mostly because I'm technically curious.

And, in transparency of how little I know about Meshtastic, in researching this story, I discovered that, in addition to the web app and apps for IOS (iPhone, iPad) and Android, there is a Meshtastic app for Mac. That's going to make it interesting…

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M17 / SP5WWP Videos on M17 Remote Radio Unit

By Steve Stroh N8GNJ

Wojciech Kaczmarski SP5WWP, the lead developer of the M17 Project, has been busy this week documenting

the M17 Remote Radio Unit in *two* (to date) videos on YouTube.

The first video is **SP5WWP's quick introduction to the Remote Radio Unit**:

In future such presentations, I hope SP5WWP can be persuaded to use a non-conductive pointer (suggestion - non-metalic chopstick). As a former electronic technician, I kept wanting to yell at the video that pointing at electronic components with a conductive pointer (a small screwdriver) on a board that's powered up, is just… a bad idea.

One of the surprises (most interesting technology) of the RRU in the first video is the inclusion of a circulator which provides protection for the (expen$ive) power amplifier module in case of loss or damage to the feedline or antenna resulting in excessive Standing Wave Ratio (SWR). That's normally a feature only found in more sophisticated radio, and illustrates the care that SP5WWP is taking with this project.

The RRU is currently in its fourth iteration, and a fifth iteration is being planned. The current RRU is capable of only FM and M17 modes, but a future generation of the RRU will incorporate "SX 1255 chips" to be able to do I/Q at higher data rates to perhaps support 64-QAM, and that version will be able to do nearly any other mode.

The second video is **SP5WWP's quick introduction to the Common Amateur Radio Interface protocol**:

One of the surprises of the second video was that there will be a **Baseband Unit (BBU)** in addition to the Remote Radio Unit (RRU). I don't recall any previous mention of the BBU, and thus I had assumed that the "Base unit" would be a simple interface to provide appropriate power to the RRU and perhaps a fiber-to-Ethernet converter. I further assumed that all the "heavy lifting" of the radio functions (waveform generation, waveform decoding, etc.) would be done in software running on a host computer.

SP5WWP discussed the BBU only briefly, with the majority of the second video discussing the protocol and messages that will be exchanged between the BBU and the RRU. SP5WWP calls this protocol CARI - Common Amateur Radio Interface.

There are four types of data within CARI:

- BBU ➡️ RRU - Baseband uplink
- BBU ⬅️ RRU - Baseband downlink
- BBU ↔️ RRU - RRU control
- BBU ⬅️ RRU - RRU feedback

This is a hugely ambitious project, but in part that's a testament to SP5WWP's relentless focus on building up M17 to offer a "full family" of hardware options. I look forward to future videos from SP5WWP on the RRU and BBU.

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ZR > BEACON

By Steve Stroh N8GNJ

Short mentions of Zero Retries Interesting items.

Armed Forces Day Crossband Test May 11, 2024

ARRL Letter for April 18, 2024:

> The US Department of Defense will host this year's Armed Forces Day (AFD) Crossband Test on May 11, 2024. For more than 50 years, military and amateur stations have taken part in this event, which is an interoperability exercise between hobbyist and government radio stations. The event is open to all licensed amateur radio operators and will not impact any public or private communications. The AFD Crossband Test is a unique opportunity to test two-way communications between military communicators and radio stations in the Amateur Radio Service (ARS), as authorized in 47 CFR 97.111.
>
> These tests provide opportunities and challenges for radio operators to demonstrate individual technical skills in a tightly controlled exercise scenario. Military stations will transmit on selected military frequencies and announce the specific ARS frequencies monitored. All scheduled times will be in Zulu (Z), and all scheduled frequencies will be upper sideband (USB) unless otherwise noted.
>
> Information on frequencies, times, and other technical information can be found at DoD MARS - Armed Forces Day. Information for QSL cards and contact information is available at Armed Forces Day QSL request form.
>
> AFD is classified as an observance -- not a federal holiday. It will be celebrated on Saturday, May 18, 2024, and it will be a time of honor. The establishment of AFD was first announced on August 31, 1949, by then US Secretary of Defense Louis Johnson. It was meant to replace the separate Army, Navy, and Air Force Days. All branches were combined to create the US Department of Defense. The first Armed Forces Day was held on May 20, 1950. The day is celebrated with special events, tributes, observances, and parades.

Intercommunication between Amateur Radio Operators and US Department of Defense is pretty cool. Most of the communication will be “radiotelephone” (voice), but there will be some data communications:

> An AFD message will be transmitted utilizing the Military Standard (MIL-STD) Serial PSK waveform
>
> (M110) followed by MIL-STD Wide Shift FSK (850 Hz RTTY) as described in MIL-STD 188-110A/B.
>
> Technical information regarding these waveforms is provided at:
>
> https://drive.google.com/drive/folders/1pYDj7kQbm-QAyY4RPtx0dOXKohjaEjq9?usp=sharing

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AREDN Release Candidate April 2024

Pseudostaffer Orv Beach W6BI on the AREDN web page:

> AREDN nightly build 20240417 has been designated as the release candidate for the next production release. If you haven't tried a nightly build recently, we encourage you to do so. There's a ton of enhancement and updates. They've all been tested, but having more people use them helps any subtle issues that might be remaining be uncovered. Here's a list of the many changes since the last production release:
>
> **Enhancements**

- Wireguard tunnels
- Configurable DHCP options
- Antenna information
- Watchdog support
- Remote logging

New Device Support

- Mikrotik mANTbox 2 12s
- GL.iNet E750
- GL.iNet GL-B1300
- GL.iNet GL-MT1300
- GL.iNet AR300M NAND
- Ubiquiti Litebeam 5AC LR
- Ubiquiti Nanobeam 2AC
- Unraid
- VMWare ESXi

Notes

- AREDN 3.24.4.0 will be incompatible with MeshChat 2.9 or earlier. Please upgrade your MeshChat install to the latest version. https://github.com/hickey/meshchat/releases/download/v2.12.0/meshchat_2.12.0_all.ipk
- GL.iNet GL-B1300 does not support negative channels on the 2.4 GHz band.

See the link for the extensive **Fixes and Improvements**, and **UI Changes**.

Meshmail - email Over Meshtastic

Meshmail is an application and protocol for sending and receiving email messages over a mesh network. It utilizes inexpensive LoRa radios running open source Meshtastic firmware.

The app can be run in either client or relay mode: a relay has internet access and manages connections to IMAP and SMTP servers, while the client has only a connection to the mesh.

When a new message arrives at the relay, it is encoded into a protobuf and then split into numerous fragments--binary blobs that are later reconstituted on the client. After generating the fragments, the relay sends a message shadow to the mesh which informs clients of the existence of the message. The shadow contains a preview of the content (subject and sender), as well as a fingerprint (a unique hashcode id), and the number of fragments used. The client then proceeds to send fragment requests and the relay responds by sending fragment blobs. Once the client has all the expected fragments, it concatenates them and reconstitutes the protobuf. Outbound mail is handled by the same protocol, but with the tag of OUTBOUND indicating to the relay that it needs to be transmitted over SMTP.

> Meshmail is currently alpha level code, but fully functional. Future potential improvements may include support for multiple clients on a single relay, more advanced email features like bcc, reply all, and attachments, relay status broadcasts, and tuning of protocol parameters.

Oh… this *is* interesting! This is the first interesting application, beyond text chatting, I've seen for Meshtastic.

BI7JTA Online Store (of Zero Retries Interesting Devices)

I know nothing of the background, or the experiences of buying from this online store. There is an interesting mix of devices for sale there such as the BP Pager for POCSAG 137-199 MHz 400-499 MHz.

DigiRig Lite Now (kind-of) Available

Image courtesy of Digirig

Digirig Lite (early access)

- $24.95
- Digirig Lite rev 1.1 – a minimalistic USB digital modes interface for amateur radio.
- Available on backorder

A minimalistic version of Digirig with the same audio code as regular model of the interface but without serial port.

- Combines audio codec and PTT switch
- Supports PTT by GPIO3 of CM108 audio codec

- Supports VOX PTT by the tone on the unused right channel (experimental)
- Works with all major OS flavors: Windows, MacOS and Linux
- Uses a single TRRS connector compatible with existing Digirig audio cables
- Growing collection of pre-made cables including popular Icom, Yaesu, Elecraft, Baofeng, Xiegu transceivers
- Isolation can be easily added using inexpensive USB isolator dongle

I think this devices is just brilliant - it's as minimalist of an audio interface as one can get!

In the short time since it was revealed, it's garnered enough excitement to rate a review on Hackaday - Emails Over Radio.

Jobs at FlexRadio

Annaliese McDermond NH6Z:

> FlexRadio is hiring four software engineers to work with me and the rest of my teammates. The company is very open to remote team members (I'm one of them, but we have a couple of others.). C/C++ experience is a plus, but we code in a variety of different languages. There's more information on our website if there's any interest.
>
> I also think we have at least one position open in our hardware engineering team.

NH6Z is an old friend and a very accomplished software engineer and *knows* Amateur Radio systems. FlexRadio got a stellar deal hiring her.

If you inquire about employment at FlexRadio, please tell them NH6Z and Zero Retries referred you.

Leave a comment

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Join the *Fun* on Amateur Radio

If you're not yet licensed as an Amateur Radio Operator, and would like to join the fun by *literally having a license to experiment with radio technology*, check out
Join the Fun on Amateur Radio for some pointers.

Zero Retries Frequently Asked Questions (FAQs) — In development 2023-02.

Closing the Channel

In its mission to highlight technological innovation in Amateur Radio, promote Amateur Radio to techies as a literal license to experiment with radio technology, and make Amateur Radio more relevant to society in the 2020s and beyond, Zero Retries is published via email and web, and is available to everyone at no cost. Zero Retries is proud *not to participate* in the Amateur Radio Publishing Industrial Complex, which hides Amateur Radio content behind paywalls.

My ongoing ***Thanks*** to:

- Tina Stroh KD7WSF for, well, *everything!*

- ***Founding Members* who generously support Zero Retries financially:**
  Founding Member 0000 - Steven Davidson K3FZT
  Founding Member 0001 - Prefers to Remain Anonymous 01

  Founding Member 0002 - Chris Osburn KD7DVD
  Founding Member 0003 - Don Rotolo N2IRZ
  Founding Member 0004 - William Arcand W1WRA
  Founding Member 0005 - Ben Kuhn KU0HN
  Founding Member 0006 - Todd Willey KQ4FID
  Founding Member 0007 - Merik Karman VK2MKZ
  Founding Member 0008 - Prefers to Remain Anonymous 14
  Founding Member 0009 - Prefers to Remain Anonymous 19

- Numerous Annual and Monthly subscribers who also generously support Zero Retries financially!

Want to Support Zero Retries?

- The *most* effective way to support Zero Retries is to simply mention Zero Retries to your co-conspirators that are also interested in knowing more about technological innovation that is occurring in Amateur Radio and encourage them to become a fellow subscriber.

- One particularly effective method of promoting Zero Retries is to add a mention of Zero Retries to your QRZ page (or other web presence) and include a link:

  https://www.zeroretries.org

- If you'd like to financially support Zero Retries, becoming a paid subscriber is *greatly* appreciated and helps offset expenses incurred in publishing Zero Retries. Paid subscriptions for Zero Retries are *entirely optional*, as explained in this special issue of ZR:
  Zero Retries Administrivia - Activating Payment Options.

These blogs and newsletters regularly feature Zero Retries Interesting content:

- Dan Romanchik KB6NU mentions "Zero Retries Interesting" topics so regularly on his blog (that I otherwise wouldn't know about) that I've bestowed on him the honorific of Pseudostaffer.

- Jeff Davis KE9V also mentions "Zero Retries Interesting" topics so regularly on his blog (that I otherwise wouldn't know about) that I've bestowed on him the honorific of Pseudostaffer.

- Amateur Radio Weekly by Cale Mooth K4HCK is a weekly anthology of links to interesting Amateur Radio stories.

- Experimental Radio News by Bennet Z. Kobb AK4AV discusses (in detail) Experimental (Part 5) licenses issued by the US FCC. It's a *must-read-now* for me!

- RTL-SDR Blog - *Excellent* coverage of Software Defined Radio units.

- TAPR Packet Status Register has been published continuously since 1982.

- Other Substack Amateur Radio newsletters recommended by Zero Retries.

These YouTube channels regularly feature Zero Retries Interesting content:

- HB9BLA Wireless by Andreas Spiess HB9BLA

- KM6LYW Radio by Craig Lamparter KM6LYW (home of the DigiPi project)

- Modern Ham by Billy Penley KN4MKB
- Tech Minds by Matthew Miller M0DQW

Zero Retries is currently using the Substack email publishing platform to publish Zero Retries. It's particularly suitable for small newsletters as you can get started for no cost.

If you're reading this issue on the web and you'd like to see Zero Retries in your email Inbox every Friday afternoon, just click below to join ***1400+*** other subscribers:

Subscribe now

Please tell your co-conspirators about Zero Retries — just click:

Share Zero Retries

Offering **feedback or comments** for Zero Retries is equally easy — just click:

Leave a comment

If you're a fellow smart person that uses **RSS**, there *is* an **RSS feed for Zero Retries**.

Social Media:

Zero Retries (N8GNJ) is on Mastodon — n8gnj@mastodon.radio — just click:

Zero Retries / N8GNJ on Mastodon

Zero Retries (N8GNJ) is also on Bluesky — @n8gnj — just click:

Zero Retries / N8GNJ on Bluesky

Email issues of Zero Retries are "instrumented" by Substack to gather basic statistics about opens, clicking links, etc.

More bits from Steve Stroh N8GNJ:

- SuperPacket blog — *Discussing new generations of Amateur Radio Data Communications — beyond Packet Radio (a precursor to Zero Retries)*
- N8GNJ blog — *Amateur Radio Station N8GNJ and the mad science experiments at N8GNJ Labs — Bellingham, Washington, USA*

Thanks for reading!
Steve Stroh N8GNJ / WRPS598 (He / Him / His)
These bits were handcrafted (by a mere human, not an Artificial Intelligence bot) in beautiful Bellingham (The City of Subdued Excitement), Washington, USA, and linked to the Internet via **Starlink *Satellite* Internet Access**.

2024-04-19

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1

Rabidly popular to the point where the FCC gave up on insisting on CB users obtaining an FCC license and use FCC assigned callsigns (I still have mine - . They re-conceptualized CB as a hobby radio service, not requiring a license, where "nearly anything goes" as long as the equipment did not transmit more than 5 watts, using AM/SSB, and within the assigned spectrum for CB. Recently, FM is now legal on US CB radios.

2

Yes, acknowledged that GMRS and GMRS repeaters were / are an option for "CBers" wishing to improve their capabilities from 27 MHz, 5 watt Citizens Band equipment.